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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/414,520	10/08/1999	KAZUE TAKAHASHI	503.37698X00	3400

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EXAMINER

ZERVIGON, RUDY

ART UNIT	PAPER NUMBER
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1763

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DATE MAILED: 09/19/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/414,520

Applicant(s)

TAKAHASHI ET AL.

Examiner

Rudy Zervigon

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 June 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-7,9 and 10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-7,9 and 10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satou et al (U. S. Pat. 5,961,850) in view of Ovshinsky et al (USPat. 5,324,553). Satou et al teaches:

- i. a plasma ECR processing apparatus (Figure 1, column 2, lines 32-58) having a vacuum processing chamber (Figure 1, item 10, column 3, lines 10-15)
- ii. a sample table (Figure 1, item 11, column 2, lines 32-58) for mounting the sample (Figure 1, item 13, column 2, lines 32-58) which is processed in the vacuum processing chamber
- iii. a plasma generation means (Figure 1, column 2, lines 45-52), wherein a plasma etching (column 2, lines 59-67; column 4, lines 32-36) of an insulating film (column 5, line 11) is carried out by generating a plasma in response to introduction of a gas (column 2, lines 59-62) which generates a plasma
- iv. A temperature of a region (items 36, 37; column 2, lines 52-58) which forms a side wall of the vacuum processing chamber is controlled to have a range of 10 °C to 120 °C (column 3, lines 10-21)
- v. A plasma processing (column 2, lines 59-67) apparatus wherein as a means for adjusting a temperature of the vacuum wall, a temperature adjusted coolant (column 3, lines 22-23) medium is used.

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Satou et al does not teach:

- vi. A microwave frequency in the 300MHz to 1GHz range
- vii. plasma generation means which generates a plasma in which the degree of plasma dissociation is a "middle" degree and the gas species containing carbon and fluorine is generated fully in the plasma
- viii. electron energies in the range of 0.25eV to 1eV
- ix.

Ovshinsky et al teaches a similar plasma ECR processing apparatus (Figure 1, column 15, lines 46-68):

- x. A microwave frequency in the 300MHz to 1GHz range (column 11, lines 40-46)
- xi. plasma generation means which generates a plasma in which the degree of plasma dissociation is a "middle" degree – column 5, lines 25-36; column 10, lines 3-6, 35-65. Further, a degree of ionization is also discussed by Ovshinsky according to chamber pressure and microwave excitation frequency (column 10, lines 3-6, 35-65)
- xii. "average electron energies around 2eV "(column 5, lines 30-35). Because Ovshinsky discusses "average" electron energies, it would be reasonably expected that electron energy values less than the average would be expected to fall within the range of 0.25eV to 1eV

It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement Ovshinsky et al's microwave frequency range and plasma "middle" degree of dissociation as operating conditions for Satou et al's plasma ECR processing apparatus.

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Motivation for implementing Ovshinsky et al's microwave frequency range and plasma "middle" degree of dissociation as operating conditions for Satou et al's plasma ECR processing apparatus is drawn to Ovshinsky's benefit of "resonating" different atomic components present in the plasma including higher energy transfers to neutrals resulting from a larger ratio of resonating ions (column 11, lines 5-46).

3. Claims 4, 6, 7, 9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satou et al (U. S. Pat. 5,961,850) and Ovshinsky et al (USPat. 5,324,553) as applied to claims 1, 2, and 5 above, and further in view of Akahori et al (USPat. 6,215,087). Neither Satou or Ovshinsky teach intermittent microwave application. Additionally, neither Satou or Ovshinsky teach carbon and fluorine plasma species. Ovshinsky only teaches fluorine species (claim 8). Akahori teaches a similar microwave plasma apparatus (Figure 1). Akahori teaches a plasma processing method using a vacuum processing chamber (21, Figure 1) for processing an insulating film (column 4, lines 10-15) on sample table (32, Figure 1). Akahori teaches plasma generation by ECR (column 4, lines 27-65) of carbon and fluorine species (column 4, lines 5-15, column 6, lines 11-23) Specifically, Akahori teaches intermittent microwave application (Figure 25c – column 15, lines 1-30).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for either Satou or Ovshinsky to implement the Akahori intermittent microwave application.

Motivation for either Satou or Ovshinsky to implement the Akahori intermittent microwave application is drawn to the rate of increase of electron temperatures and "radicals of high energy" (column 15, lines 30-40).

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***Response to Arguments***

4. Applicant's arguments with respect to claims 1, 2, 4-7, 9 and 10 have been considered but are moot in view of the new grounds of rejection.

9.

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***Conclusion***

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (703) 305-1351. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official after final fax phone number for the 1763 art unit is (703) 872-9311. The official before final fax phone number for the 1763 art unit is (703) 872-9310. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (703) 308-0661. If the examiner can not be reached please contact the examiner's supervisor, Gregory L. Mills, at (703) 308-1633.

  
GREGORY MILLS  
SUPERVISORY PATENT EXAMINER  
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